

WHAT IS CLAIMED IS:

1. A light-emitting apparatus package, comprising:  
a ceramic substrate having an electric insulating property and a good heat conductivity;

a first concave section recessed in a thickness direction of the ceramic substrate, the first concave section providing a light exit aperture on a first surface of the ceramic substrate;

a second concave section, provided in the first concave section, and further recessed in the thickness direction of the ceramic substrate, the second concave section for providing an area for mounting a light-emitting device;

a wiring pattern provided in at least one of the first concave section and the second concave section, the wiring pattern for supplying electricity to the light-emitting device; and

a metalized layer, (i) provided on an inside-concave-section surface of the ceramic substrate in such a manner that the area for mounting the light-emitting device is sandwiched between the metalized layer and the light exit aperture, and in such a manner that the metalized layer is electrically insulated from the wiring pattern, the metalized layer having a light reflective property.

2. The light-emitting apparatus package as set forth in Claim 1, further comprising:

an insulating layer under the wiring patterns,  
the insulating layer being sandwiched between the metalized layer and the wiring patterns.

3. The light-emitting apparatus package as set forth in Claim 1, further comprising:

a printed reflective section provided in that part of the inside-concave-section surface in which the metalized layer and the wiring pattern are not formed, the printed reflective section for reflecting light.

4. The light-emitting apparatus package as set forth in Claim 1, wherein:

the metalized layer is exposed within the second concave section.

5. The light-emitting apparatus package as set forth in Claim 1, wherein:

the ceramic substrate contains aluminum nitride.

6. The light-emitting apparatus package as set forth in Claim 1, wherein:

the metalized layer functions as a part of a wiring pattern.

7. The light-emitting apparatus package as set forth in Claim 1, further comprising:

a dam-for-resin section provided along a periphery of an aperture of the second concave section.

8. The light-emitting apparatus package as set forth in Claim 1, further comprising:

a third concave section on a second surface of the ceramic substrate, the third concave section for mounting a chip component for stabilizing operation of the light-emitting device.

9. A light-emitting apparatus, comprising:

a light-emitting apparatus package including

(i) a ceramic substrate having an electric insulating property and a good heat conductivity,

(ii) a first concave section recessed in a thickness direction of the ceramic substrate, the first concave section providing a light exit aperture on a first surface of the ceramic substrate,

(iii) a second concave section, provided in the first concave section, and further recessed in the thickness

direction of the ceramic substrate, the second concave section for providing an area for mounting a light-emitting device,

(iv) a wiring pattern provided in at least one of the first concave section and the second concave section, the wiring pattern for supplying electricity to the light-emitting device, and

(v) a metalized layer, (i) provided on an inside-concave-section surface of the ceramic substrate in such a manner that the area for mounting the light-emitting device is sandwiched between the metalized layer and the light exit aperture, and in such a manner that the metalized layer is electrically insulated from the wiring pattern, the metalized layer having a light reflective property;

said light-emitting apparatus, comprising:

a light-emitting device, provided in the second concave section, the light-emitting device having an electrode on that part of the inside-concave-section surface in which no light-emitting device is provided;

a wire for electrically connecting the wiring pattern and the electrode of the light-emitting device; and

a transparent resin section for sealing the light-emitting device and the wire, the transparent resin having light transmitting property.

10. A light-emitting apparatus, comprising:  
a light-emitting apparatus package including

(i) a ceramic substrate having an electric insulating property and a good heat conductivity,

(ii) a first concave section recessed in a thickness direction of the ceramic substrate, the first concave section providing a light exit aperture on a first surface of the ceramic substrate,

(iii) a second concave section, provided in the first concave section, and further recessed in the thickness direction of the ceramic substrate, the second concave section for providing an area for mounting a light-emitting device,

(iv) a wiring pattern provided in at least one of the first concave section and the second concave section, the wiring pattern for supplying electricity to the light-emitting device, and

(v) metalized layer, provided (1) on an inside-concave-section surface of the ceramic substrate in such a manner that the area for mounting the light-emitting device is sandwiched between the metalized layer and the light exit aperture, and (2) in such a manner that the metalized layer is electrically insulated from the wiring pattern, the metalized layer having a light reflective

property;

said light-emitting apparatus, comprising:

a light-emitting device, provided in the second concave section, having an electrode in an area in which the light-emitting device is provided, and an electrode in an area in which no light-emitting device is provided;

a conductive adhesive section for connecting (a) the electrode in the area in which the light-emitting device is provided, and (b) the metalized layer, and for fixedly holding the light-emitting device on the metalized layer;

a wire for electrically connecting (a) the wiring pattern and (b) the electrode in the area in which no light emitting pattern is provided;

a resin section, provided on that part of an inside-surface of the first concave section, the resin section having a light reflecting property;

a transparent resin section for sealing the light-emitting device and the wire, the transparent resin having light transmitting property.

11. A light-emitting apparatus, comprising:

a light-emitting apparatus package including

(i) a ceramic substrate having an electric insulating property and a good heat conductivity,

(ii) a first concave section recessed in a thickness

direction of the ceramic substrate, the first concave section providing a light exit aperture on a first surface of the ceramic substrate,

(iii) a second concave section, provided in the first concave section, and further recessed in the thickness direction of the ceramic substrate, the second concave section for providing an area for mounting a light-emitting device,

(iv) a wiring pattern provided in at least one of the first concave section and the second concave section, the wiring pattern for supplying electricity to the light-emitting device;

(v) a metalized layer, provided (1) on an inside-concave-section surface of the ceramic substrate in such a manner that the area for mounting the light-emitting device is sandwiched between the metalized layer and the light exit aperture, and (2) in such a manner that the metalized layer is electrically insulated from the wiring pattern, the metalized layer having a light reflective property, and

(vi) a dam-for-resin section provided along a periphery of an aperture of the second concave section,

said light-emitting apparatus, comprising:

a light-emitting device, provided in the second concave section, having an electrode in an area in which

the light-emitting device is provided, and an electrode in an area in which no light-emitting device is provided;

a wire for electrically connecting (a) the wiring pattern and (b) the electrode in the area in which no light emitting pattern is provided;

a resin section, provided on that part of an inside-surface of the first concave section between the dam-for-resin section and the inside-surface of the first concave, the resin section having a light reflecting property;

a transparent resin section for sealing the light-emitting device and the wire, the transparent resin having light transmitting property.

12. A light-emitting apparatus, comprising:

a light-emitting apparatus package including

(i) a ceramic substrate having an electric insulating property and a good heat conductivity,

(ii) a first concave section recessed in a thickness direction of the ceramic substrate, the first concave section providing a light exit aperture on a first surface of the ceramic substrate,

(iii) a second concave section, provided in the first concave section, and further recessed in the thickness direction of the ceramic substrate, the second concave



section for providing an area for mounting a light-emitting device,

(iv) a wiring pattern provided in at least one of the first concave section and the second concave section, the wiring pattern for supplying electricity to the light-emitting device,

(v) a metalized layer, provided (1) on an inside-concave-section surface of the ceramic substrate in such a manner that the area for mounting the light-emitting device is sandwiched between the metalized layer and the light exit aperture, and (2) in such a manner that the metalized layer is electrically insulated from the wiring pattern, the metalized layer having a light reflective property,

(vi) a third concave section on a second surface of the ceramic substrate, the third concave section for mounting a chip component for stabilizing operation of the light-emitting device;

said light-emitting apparatus, comprising:

a light-emitting device, provided in the second concave section, having an electrode in an area in which the light-emitting device is provided, and an electrode in an area in which no light-emitting device is provided;

a wire for electrically connecting (a) the wiring pattern and (b) the electrode in the area in which no light

emitting pattern is provided;

a resin section, provided on that part of an inside-surface of the first concave section, the resin section having a light reflecting property;

a transparent resin section for sealing the light-emitting device and the wire, the transparent resin having light transmitting property; and

a chip component provided within the third concave section.

13. A light-emitting apparatus, comprising:

one or more light-emitting devices for emitting light by converting a current into the light;

at least one light-emitting device substrate on a first surface of which at least one of the one or more of the light-emitting devices is provided;

a heat-discharging member bonded to at least one of a second surface and third surfaces of the light-emitting device substrate.

14. The light-emitting apparatus as set forth in Claim 13, wherein:

only an adhesive agent and the light-emitting device substrate are provided between the light-emitting device and the heat discharging member, the adhesive agent for

die-boding the light-emitting device and the light-emitting device substrate.

15. The light-emitting apparatus as set forth in Claim 13, further comprising:

a connecting substrate, provided on the first surface of the light-emitting device substrate, having a predetermined wiring pattern for supplying electricity to said one or more light-emitting devices,

the connecting substrate having a light-transmitting section provided in a position, corresponding to a position of said one or more light-emitting devices.

16. The light-emitting apparatus as set forth in Claim 15, wherein:

the light-emitting device substrate includes a electrode-wiring terminal in at least one of both edges of the surface of the light-emitting device substrate, the electrode-wiring terminal for establishing connection with a predetermined wiring pattern provided on the connecting substrate.

17. The light-emitting apparatus as set forth in Claim 16, wherein:

a plurality of the light-emitting device substrates are

arranged in one or more lines and the predetermined wiring patterns of the plurality of the light-emitting device substrates are electrically connected with electrode-wiring terminal of the connecting substrate.

18. The light-emitting apparatus as set forth in Claim 13, wherein:

the light-emitting device substrate is a ceramic substrate.

19. The light-emitting apparatus as set forth in Claim 13, wherein:

the light-emitting device is a light-emitting diode chip.

20. The light-emitting apparatus as set forth in Claim 19, wherein:

a plurality of the light-emitting devices emit light in different colors from the others.

21. The light-emitting apparatus as set forth in Claim 13, wherein:

the light-emitting device is die-bonded to a predetermined position of the wiring pattern provided on the first surface of the light-emitting device substrate, and

an electrode of the light-emitting device is wire-bonded to another predetermined position of the wiring pattern via a connecting wire.

22. The light-emitting apparatus as set forth in Claim 21, wherein:

a concave section is provided on the surface of the light-emitting device substrate, the light-emitting device being die-bonded to a predetermined position of a wiring pattern provided within the concave section;

the light-emitting device mounting substrate has a concave section on the first surface thereof; and

the light-emitting device is die-bonded to a predetermined position of a wiring pattern provided within the concave section.

23. The light-emitting apparatus as set forth in Claim 22, wherein:

the concave section includes a deeper concave section in a center section thereof, and a shallower concave section around the deeper concave section, and

the light-emitting device is die-bonded to a predetermined position of a wiring pattern provided within said deeper concave section, whereas an electrode of said light-emitting device is wire-bonded to a predetermined

position of a wiring pattern provided within said shallower concave section.

24. The light-emitting apparatus as set forth in Claim 21, wherein:

the light-emitting device is die-bonded to a predetermined position of a wiring pattern provided on a flat surface of the light-emitting device substrate.

25. The light-emitting apparatus as set forth in Claim 15, wherein:

the light-transmitting section includes a lens means for preventing dispersion of light that is emitted from the light-emitting device.

26. The light-emitting apparatus as set forth in Claim 15, wherein:

the light-transmitting section is a window section.

27. The light-emitting apparatus as set forth in Claim 25, wherein:

the lens means is fitted in a window section as light-transmitting section so that the lens means is not protruded out above the first surface of the connecting substrate.

28. The light-emitting apparatus as set forth in Claim 25, wherein:

the lens means is a micro lens means.

29. The light-emitting apparatus as set forth in Claim 28, wherein:

the micro lens mean is located on a surface of the connecting substrate, the surface being reverse to the surface that faces the light-emitting substrate;

the micro lens means includes:

a transparent sheet member; and

a plurality of micro lenses on said transparent sheet member, the plurality of micro lenses arranged in one or more lines.

30. The light-emitting apparatus as set forth in Claim 15, wherein:

the connecting substrate is made of a transparent material having no color; and

the lens means is incorporated in the connecting substrate.

31. The light-emitting apparatus as set forth in Claim 21, wherein:

a periphery of the light-emitting device and a periphery of the connecting wire are molded with resin.

32. The light-emitting apparatus as set forth in Claim 25, wherein:

the lens means is a dome-like section shaped at the surface of the resin molding which molds at least a periphery of the light-emitting device.

33. The light-emitting apparatus as set forth in Claim 31, wherein:

the resin contains a fluorescer, which emits light in a desired color by being excited by the light emitted from the light-emitting device.

34. The light-emitting apparatus as set forth in Claim 15, wherein:

the connecting substrate includes, on a surface thereof, a transparent sheet member containing a fluorescer, which emits light in a desired color by being excited by the light emitted from the light-emitting device, the surface being reverse to the surface that faces the light-emitting substrate.

35. The light-emitting apparatus as set forth in



Claim 33, wherein:

the light-emitting device emits light in a color in a blue or a ultra violet region.

36. A backlight apparatus, comprising:

a light-emitting apparatus; and

a light guide plate whose light-receiving end face faces a light-emitting surface of said light-emitting apparatus, said light guide plate propagating therethrough light received on said light-receiving end face, and then emitting the light from a surface,

said light-emitting apparatus including (i) one or more light-emitting devices which emit light when electricity is supplied, (ii) a light-emitting device substrate having at least one of the light-emitting devices provided on a surface of the light-emitting device substrate, and (iii) a heat-discharging member which is bonded to any one of a second surface and third surfaces of the light-emitting device substrate.

37. A display apparatus, comprising:

a display panel having a pair of substrates, which sandwich a displaying medium therebetween, said display panel displaying by applying a display voltage between the substrates;

a backlight apparatus provided on a second surface of said display panel,

the backlight apparatus including (i) a light-emitting apparatus, and (ii) a light guide plate whose light-receiving end face faces a light-emitting surface of said light-emitting apparatus, said light guide plate propagating therethrough light received on said light-receiving end face, and then emitting the light from a surface,

said light-emitting apparatus including (i) one or more light-emitting devices which emit light when electricity is supplied, (ii) a light-emitting device substrate having at least one of the light-emitting devices provided on a surface of the light-emitting device substrate, and (iii) a heat-discharging member which is bonded to any one of a second surface and third surfaces of the light-emitting device substrate.

38. The display apparatus as set forth in Claim 37, wherein:

the display panel is a liquid crystal display panel in which the displaying medium is a liquid crystal layer sandwiched between the pair of the substrates, and said liquid crystal display panel displaying by changing orientation of a liquid crystal molecule in each of picture

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elements by applying a display voltage between the substrates, the picture elements being arranged in matrix.